
# Understanding the experiences of older adults using technology to stay connected:

# A facilitator or creator of new vulnerabilities?

Final project report

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## Acknowledgements

This work was supported by the British Academy/Leverhulme small research grants, under grant number SRG18R1\180818.

We would like to thank the participants who took the time to tell us their stories, and those that took the time to complete the survey. We would like to thank and acknowledge the photographs produced by Aidan Gates, and the expertise provided by Qualtrics in distributing the survey. Finally, we would like to thank Amrita Singh, the technical sound expert who produced the podcast accompanying this report.

## Supplementary Online material

### Podcast

A podcast has been developed to illustrate and discuss the findings from Phase one of this study. This podcast is available to listen to, and download, on the following platforms:

| | |
|---|---|
| Spotify | https://open.spotify.com/show/3YaugSTw5wTNCujhTZSTug |
| Soundcloud | https://soundcloud.com/user-589740502/ageing-in-a-digital-world |
| iTunes | https://podcasts.apple.com/gb/podcast/ageing-in-a-digital-world/id1506615062?i=1000470663608 |

## Blogs

1. Centre for Ageing Better
   "How the digital divide affects older adults' use of technology during COVID-19"
   https://www.ageing-better.org.uk/blogs/how-digital-divide-affects-older-adults-use-technology-during-covid-19

2. Fuse
   "COVID-19 has brought the "digital divide" to the fore"
   https://fuseopenscienceblog.blogspot.com/2020/05/covid-19-has-brought-digital-divide-to.html

3. UCL Loneliness and Mental Health Network
   "Connecting with others during COVID-19: Older adults' use of social media and visual tools"
   https://www.ucl.ac.uk/psychiatry/sites/psychiatry/files/blog_how_can_technology_impact_social_connection_for_older_adults_during_covid.pdf

4. National Institute for Health Research (NIHR) Enabling Research in Care Homes (ENRICH)
   "Technology as a tool for social connection during COVID-19: Translating findings to care homes"
   https://enrich.nihr.ac.uk/blogpost/technology-as-a-tool-for-social-connection-during-covid-19-translating-findings-to-care-homes/

5. The Centre of Innovative Ageing (CIA)
   "Ageing in a Digital World: What role does technology play in social connection?"
   https://ciaswanseablog.wordpress.com/2020/09/15/ageing-in-a-digital-world-what-roles-does-technology-play-in-social-connection/

## Webinar

The Centre for Ageing and Dementia Research (CADR) webinar

"Ageing in a Digital World"

https://www.youtube.com/watch?v=RLk7gAC5wEE&feature=emb_logo

## Invited interview

The Centre for Ageing Better

https://www.youtube.com/watch?v=vgJzgDPoQxo&feature=youtu.be

## Executive Summary

With rapid technological change, smart mobile technology has resulted in digital devices, social media, and the internet being suggested as potential solutions to promote social connection in later life. However, evidence in this field is insufficient and contradictory. This study aimed to explore older adults' experiences of using technology (including social media) to connect with others. Specifically, this study aimed to understand:

- Motivations for, and preferences towards, using digital devices and social media as a tool to connect with others
- The impact of self-reported loneliness or social isolation on motivations for, and preferences towards, using digital devices and social media
- Factors that enable or prevent older adults accessing, or using, digital devices and social media to connect with others
- The impact of self-reported loneliness or social isolation in enabling or preventing older adults accessing, or using, digital devices and social media

A mixed methods two-phase exploratory sequential design was utilised. Phase one involved semi-structured interviews conducted with 20 older adults (65+ years) across England, Scotland, and Wales. The findings from Phase one informed Phase two, a large survey completed by 410 older adults (65+ years) across England, Scotland, Northern Ireland, and Wales. Findings from Phase one were analysed using Thematic Analysis, and findings from Phase two were analysed using descriptive and inferential statistics.

Access and use of digital devices and social media were valued as tools for social connection. However, online communication was perceived as being supplementary, and not a replacement for face-to-face communication. Specifically, visual communication tools (e.g. Skype, Zoom, and Facetime) were perceived positively, due to being most reminiscent of face-to-face communication. Importantly, Phase two identified a relationship between loneliness, social isolation, and older adults' technology use. Older technology users who were neither lonely nor isolated used digital devices, social media, and visual communication tools to connect with others significantly more often than those who experienced loneliness, isolation, or both.

Despite being regular technology users, individuals still faced biopsychosocial barriers when using technology for social connection, including physical functioning, self-efficacy, fear, attitudes toward communication, culture of communication, and social capital. The findings demonstrated that these biopsychosocial barriers can significantly heighten inequalities for individuals in many ways, even those with access and skills to use this technology. Phase

two identified negative attitudes as being the only psychosocial factor that significantly predicted both digital device use and social media use across the groups.

**Recommendations for practice**

1. This study showed that individuals experiencing loneliness or social isolation use technology for social connection significantly less than those not experiencing loneliness or isolation. A preventative approach should be taken in supporting lonely or isolated individuals with opportunities to engage with technology for social connection.
2. Negative attitudes adversely affected use of digital devices and social media, independent of loneliness or social isolation, therefore, interventions should aim to target negative attitudes around using social technologies for all individuals.
3. This study showed that digital exclusion can also be experienced by regular technology users, and it is therefore recommended that the definition of digital exclusion is broadened and includes wider biopsychosocial factors. It is imperative that regular technology users are not overlooked when new technologies and services are being developed, or digital connection is being promoted. This will help to maximise the regular use, minimise the potential of disengaging, and promote the use of technology for social connection.

## Introduction

Evidence suggests that social connection is one of the key reasons for technology use, specifically as a means to keep up with friends and family (1, 2). Particularly, this technology is seen as one solution to both alleviate and prevent loneliness in later life (3-5). This technology includes digital devices ranging from the telephone, smartphones, and tablets, as well as social technology, such as social media sites, text messaging services, and video calling tools. These devices and applications allow people to contact others anywhere and at any time (1, 2, 6) and enable people to feel a wider sense of social inclusion (1, 2, 7). However, much of the evidence is contradictory, with several studies having identified a positive effect between technology and a reduction in loneliness (3, 8, 9) and other studies having found that technology had no effect on levels of reported loneliness (e.g. 10, 11-13).

Furthermore, despite the potential benefits that technology can have on social connection, not everyone has access to, or the skills to use, this technology. Digital exclusion is considered as being differentiated into three levels: access (first-level divide), skills and usage (second-level divide), and the offline tangible outcomes from using internet use (third-level divide) (14-16).

## Project aims

This study aimed to explore older adults' experiences of using technology (including social media) to connect with others. Specifically, this study aimed to understand:

- Motivations for, and preferences towards, using digital devices and social media as a tool to connect with others
- The impact of self-reported loneliness or social isolation on motivations for, and preferences towards, using digital devices and social media
- Factors that enable or prevent older adults accessing, or using, digital devices and social media to connect with others
- The impact of self-reported loneliness or social isolation in enabling or preventing older adults accessing, or using, digital devices and social media

## Method

### Design

A mixed methods two-phase exploratory sequential design (17) was adopted for this study. In line with this design, qualitative data was initially collected and analysed in Phase one, and the resultant themes were then used to inform Phase two, an online quantitative survey which was used to explore the research issues further. This study received ethical approval from Northumbria University's ethical approval system (Ref: 12734).

### *Phase One*

### Participants

In order to participate in Phase one of this study, individuals must have been aged 65 or above, and using digital devices and/or social media to connect with others at the time of the study. Twenty participants were recruited as part of this study (Table 1).

**Table 1: Participant characteristics (Phase one)**

| **Demographic information** | **N=** | **%** |
|---|---|---|
| **Age (years)** | | |
| 65-74 | 8 | 40% |
| 75-84 | 12 | 60% |
| 85+ | 0 | 0% |
| **Gender** | | |
| Female | 12 | 60% |
| Male | 8 | 40% |
| Other | 0 | 0% |
| **Country** | | |
| England | 11 | 55% |
| Northern Ireland | 0 | 0% |
| Scotland | 2 | 10% |
| Wales | 7 | 35% |
| **Marital status** | | |
| Bereaved | 8 | 40% |
| Married, Civil Partnership, Cohabiting, in a relationship | 6 | 30% |
| Other | 0 | 0% |
| Separated or divorced | 1 | 5% |
| Single | 5 | 25% |

Of the participants recruited in Phase One, 60% were female, and over half of the respondents (55%) lived in England. Participants were aged between 65-83 years old (mean age 71.55). Marital status varied across the sample with almost half (40%) were bereaved, 30% were in a relationship (including marriage, civil partnership, and co-habiting), 25% were single, and 5% were either separated or divorced.

### Procedure & Data Collection

The study was advertised on various social media platforms. Furthermore, relevant third-sector organisations and public libraries across the UK were approached to assist with the advertising of the study. All advertising and project information was available in English and Welsh languages. A snowball sampling strategy was also used.

If participants wished to proceed, a date and time were arranged to conduct the interview, either by telephone, face-to-face, or using video communication tools (e.g. Skype). Semi-structured interviews were conducted face-to-face or over the phone, using an interview schedule (Appendix A). The interviews explored the individuals' own perspectives, developing insight into the motivations, facilitators, barriers, and experiences of using technology.

Interviews were audio recorded using a Dictaphone and were transcribed verbatim.

### Data Analysis

All interview transcripts were analysed using Thematic Analysis, adhering to the six steps set out by Braun and Clarke (18). The NVIVO 12 software package was used to facilitate analysis of this data.

## *Phase Two*

### Participants

Phase two employed an online survey tool to further explore themes generated in Phase one. The research team engaged with project managers at Qualtrics to promote the recruitment of a large and representative survey sample. Representation was sought after based on age (with all participants being over 65 years old) gender, and geographical representation (Greater London; Mid-England; Northern England; Southern England; Northern Ireland/Wales; Scotland).

Invitations were sent to a total of 788 participants. After a process of screening based on our criteria and removing duplicates, 412 participants qualified and subsequently 410 participants completed the survey in full (Table 2).

**Table 2: Participant characteristics (Phase two)**

| Demographic information | N= | % |
|---|---|---|
| **Age (years)** | | |
| 65-74 | 348 | 84.9% |
| 75-84 | 59 | 14.4% |
| 85+ | 3 | 0.7% |
| **Gender** | | |
| Female | 204 | 49.8% |
| Male | 205 | 50% |
| Other | 1 | 0.2% |
| **Country** | | |
| England | 344 | 83.9% |
| Northern Ireland and Wales | 33 | 8.05% |
| Scotland | 33 | 8.05% |
| **Marital status** | | |
| Bereaved | 43 | 10.48% |
| Married, Civil Partnership, Cohabiting | 278 | 67.8% |
| Other | 4 | 0.97% |
| Separated or divorced | 62 | 15.12% |
| Single | 23 | 5.61% |
| **Education** | | |
| Below degree level | 179 | 43.65% |
| Degree or above | 112 | 27.31% |
| No formal qualifications | 64 | 15.61% |
| Other | 55 | 13.41% |

### Survey instrument

The online survey (Appendix B) aimed to explore if, and to what extent, engagement with technology impacted self-reported loneliness and social isolation, as well as exploring the number of factors which may facilitate or hinder their engagement/relationship with technology. Such factors include technological issues, as well as psychological factors like reasons/motivations for using technology and attitude/feelings about technology. The survey took an average of 20 minutes to complete.

### Data analysis

To measure loneliness and social isolation, the De Jong Gierveld Loneliness Scale (19) counts the neutral and positive responses for both the emotional and social loneliness questions. The sum of both scores gives a total loneliness score, which ranges from 0 (not lonely) through to 5 (extremely lonely). A cutting score of 2 distinguishes between lonely and non-lonely individuals (20, 21). Likewise, the Lubben Social Network scale (22) is also separated into two categories: family and friends. Each of these categories contained three questions and each of these questions is equally weighted and scored from 0-5 with an overall score of between 0-30 higher scores indicate larger social networks. A score of less than 12 is deemed to be

socially isolated (23). In order to get a nuanced analysis the research drew on the four fold typology of loneliness and social isolation proposed by Townsend (24) and developed by Tunstall (25). Scores for the Lubben social Network scale and De Jong Gierveld Loneliness Scale measures were dichotomised based on the cut-off points into 'lonely/not lonely' and 'isolated /not isolated.'

A syntax was run on SPSS based on the dichotomised scores which created four participant categories on the loneliness/isolation spectrum: neither lonely nor isolated, lonely but not isolated, isolated but not lonely, and both lonely and isolated. These categories then formed the basis of the analysis. For analytical purposes, these four categories were then amalgamated into two of equal sample size: i) Neither Lonely nor Isolated (NLNI; n=205) or ii) Either Lonely, Isolated, or Both (ELIB; n=205). This enabled the research aims to be addressed and the relationship between social isolation, loneliness, and technology use to be examined.

Simple frequencies measured the extent to which participants used digital devices and social media platforms. Independent sample t-tests were used to compare frequency of digital device use and social media use. A visual communications index was also created through a simple aggregate of the four binary items (sending photographs, receiving photographs, making video calls, receiving video calls). A chi-square analysis was used to assess how the extent of visual communication tools differed between the two groups. Finally, multiple regression models were ran using the stepwise method to predict frequency of digital and social media use from barriers (negative attitudes) and facilitators (relationship maintenance, passing time, virtual community, entertainment, coolness and companionship). Age, gender, and education were controlled. The analysis arrived at four models of factors predicting frequency of digital technology use and social media use for both participant groups (NLNI and ELIB).

## Phase one findings

Two broad themes were generated from the qualitative data, each with their own sub-themes: technology as a tool for social engagement, and the facilitators and barriers of technology use (Figure 1).

**Figure 1: Themes and sub-themes**

| | |
|---|---|
| Technology as a tool for social engagement | Technology as a connector |
| | The importance of the visual |
| | Technology as supplementary rather than a replacement |
| Facilitators and barriers of technology use | Perceived self-efficacy |
| | Fear |
| | Culture and communication |
| | Social capital |
| | Physical functioning |

### Theme 1: Technology as a tool for social engagement

#### *Technology as a connector*

Individuals discussed the benefits of technology for social connection, particularly as a way of connecting with family and friends living geographically dispersed.

> *"I mean a lot of them are from a long, long, way, away and you're not likely to see them. I mean there is one in [another country]. So yes, it's nice just to get some news" (P010)*

The use of online communication also acted as a connector in that it increased the frequency of communication with family and friends.

> *"[My children and I don't] communicate too often, but with a WhatsApp family page and things we throw things at each other […] My son is abroad at the moment, we've been hearing about him. He works abroad quite a lot, so he keeps in touch that way" (P017)*

Most participants used social media as a way of maintaining 'meaningful' relationships with their existing circle of family and friends, as opposed to conversing with people they did not know, or without reason.

> *"Unless there is a possibility of some connection, some point of it then I don't care. I don't need thousands of so-called friends" (P003)*

One participant, a carer, who described himself as "*almost housebound*" (P012), used social media to connect with others, and this was the only opportunity they had to connect with others.

> *"Social isolation is one of the big problems and to know that there is someone that you can just greet and say something to when you get up in the morning is helpful" (P012)*

P012 felt that Twitter provided a caring environment to develop meaningful relationships, although this form of communication could be inconsistent and unreliable.

> *"Well it's just on Twitter so if they come up, they come up. They're all in the same place, so if they say something I might respond. If they're not there then if I don't hear anything for a couple of days I might say, 'Is everything okay?'" (P012)*

Despite the benefits of using technology to connect with others, it was not always perceived as being optional, and using technology to communicate with others was now perceived as being a necessity.

> *"But [I use Facebook] just to keep a check and see exactly what they are all up to you know, otherwise I just don't know what is happening and I do feel a bit cut off" (P002)*

Individuals reflected on the negative consequences for peers without digital skills, or without access to digital devices: "*those that can and those that can't" (P003).*

> *"A lot of people seem to communicate a lot via technology, rather than actually communicating directly and meeting up […] and that can be quite isolating, especially for older people, I think […] a lot of people I know that are older than me, around my age and older than me, they don't have computers […] so yeah, I think a lot of older people become more isolated because as other younger people tend to use a lot of computers and a lot of phone messages, and I think older people can become quite isolated" (P011)*

Generally, technology was perceived as a connector, and those who do not use technology could be left out. However, some individuals did acknowledge how technology itself could be isolating.

> *"[Technology] has it's uses but you do have to watch yourself otherwise you could sit all day on social media and never get out of the house" (P007)*

Overall, online communication was perceived as being a positive tool to allow individuals to connect with their family and friends, and maintain existing offline relationships.

### *The importance of the visual*

Participants described online communication as being a method of keeping in touch with one another when face-to-face communication was not possible. Visual communication via video calling applications, or sharing photographs, was the mode of online communication most similar to being there in person. Participants described '***really***' getting a sense of knowing how someone was feeling when being able to see them and connecting with that person on a deeper level than telephone or other online communication.

> *"I mean it's the visual. If you're having a conversation with someone and you can see their face and see the response and the smiles and the rest, it just adds something, doesn't it? […] And the same with the telephone you can find out that you have an argument starting that wouldn't be there if you could see the twinkle in the eye" (P012)*

Sharing photographs was also an important part of visual communication.

> *"It's a wonderful thing, it's a wonderful thing to move photographs around, to chat to people around the world" (P003)*

Most participants talked of family members sending photographs to them, rather than the participants sending photographs themselves.

> *"I like seeing the others' photographs, as I say I haven't actually done it, sent any myself" (P013)*

There was passivity in some online communication. The way in which most individuals actively shared photographs was in showing or sending photographs of their relatives to others.

Visual communication was also perceived as being important for their family, with one participant describing it as a way for grandchildren not to forget about their grandparents.

> *"My son says, he wants them to keep contact with us as well, so they don't forget who their grandparents are" (P005)*

However, P004 described the negative consequences of video calling for her young granddaughter.

*"My daughter has problems with the youngest one, she gets very upset because she can see you, but she can't touch you. So, we tend not to do FaceTime a lot, but it is there if you need it" (P004)*

Another downside to video calling was apprehension around their own appearance and body image.

*"FaceTime. I'm not very keen on it because I have too many wrinkles […] I am not keen on FaceTime, no, unless I am all made up" (P001)*

Online visual communication was valued by participants as being most like face-to-face communication, although there were some drawbacks to using video calling applications and sending photographs.

### *Technology as supplementary rather than a replacement*

Many participants felt that technology was a useful tool to keep up to date with others, but that it did not replicate spending time with one another. Participants described technology as "*just a tool" (P003)* and as a *"short cut when you need it" (P006).*

*"More crucially is not allowing technology to be the be all and the end all. There is that need for people to always have people" (P020)*

Some felt that online and telephone communication was more so a method of checking up on one another rather than having an actual conversation.

*"Having a person sitting in front of you and talking to you is much better than having a 10-minute phone call with somebody saying, you know, 'How are you? You're okay, are you?', you know just checking up like that. It's much better having a conversation, having somebody around for tea or having somebody in the house for an hour" (P011)*

One of the most striking issues when discussing the replacement of face-to-face communication with technology, was the perceived differences across generations. Many participants noted different views across their family.

*"My granddaughter is pregnant, the baby is due anytime now so there is sort of a running commentary going on all the time […] I find that good, but I do find sometimes you'll get a text message when a phone call would have been nicer" (P013)*

The decision to communicate online was often as they felt it was less intrusive when their

families led busy lives and may not have time to talk to them.

> *"You don't want to be intruding if you're ringing up you don't know, is it a good time or whatever. So, in those instances you can send an email or something on Messenger and then when they're ready, they can respond. So that's a good thing" (P016)*

Individuals overwhelmingly preferred face-to-face communication and perceived online communication as a supplementary tool to maintain relationships, rather than as a way of replicating other forms of communication.

## Theme 2: Facilitators and barriers of technology use

### *Perceived self-efficacy*

Despite all participants being users of digital devices and social media, many participants described themselves as beginners, or as not being "*technology minded*" (P005). Particularly, P002, who experienced low self-efficacy and a lack of patience with technology.

> *"To be honest I just didn't have patience with [my desktop computer]" (P002)*

> *"I mean I never ever for one moment thought I was thick, but by gum, I'm beginning to wonder because I just can't take it in at all" (P002)*

One participant described how rapid technological progression made him feel left behind.

> *"Actually, it has to be said that technology now flies over my head, I used to keep up with it but now… […] it has to said, technology has flown past me to a certain extent" (P011)*

Higher levels of self-efficacy were often related to early technology adoption. Many participants described how they had used technology in their workplace and expressed how their own familiarity had a positive impact on current use.

> *"I wouldn't say that I regard myself as a geeky type of person but my first computer, I bought probably 40 years ago now almost. It was very much in its infancy and I actually built the computer to start with" (P020)*

This was supported by participants who experienced lower levels of self-efficacy and did not consider themselves as being early adopters.

> *"I'm liable, the occasions that I do go on it, I have to scream, help, why can't I get this? Why can't I get that? I don't like it. I've not grown up with one. I have persevered with these and I can adapt. I don't need anymore" (P018)*

The participants considered their own lower levels of self-efficacy and a lack of familiarity with technology as being age dependent. Individuals considered their peers and those older than them as having low levels of understanding or as being unexperienced in using technology.

> *"I know a lot of friends of my age hardly use mobile technology or computers. They just feel very uncomfortable and don't know what they are doing" (P017)*

There was also some consideration of the participants' own ageing and its potential to impact their own future use of technology.

*"I don't know if there will come a time as I get older when I drop out because I feel I can't keep up with it anymore. I don't think I will. I don't think that the pace is, you know, beyond me" (P019)*

Use of technology was perceived as being due to early adoption and ageing. Individuals who were more familiar with computers during their working years had higher levels of confidence than those picking up technology for the first time. Ageing was considered by the participants as being detrimental to technology use.

### *Fear*

Some participants were worried when using digital devices and social media, as they were often worried about breaking them.

*"When I had the computer, I was really sort of nervous. I was thinking it would all crash or cease up or something would go terribly wrong with it, but that's not a fact is it? It's very rare that you sort of go badly wrong. You can usually sort things out. There is a little bit of fear I think of new technology particularly with the older age group" (P013)*

Fear was also experienced in respect of participants' own privacy and security. This impacted their use of social media and individuals often had concerns when posting information on social media sites.

*"I don't want everyone to know what I am doing, when I am doing it kind of thing. I think we're more cautious" (P002)*

There was also fear surrounding security, and being hacked, when using social media sites, but also using the internet more generally.

*"One thing you do sort of wonder about the technology, how many people can hack in and get to know your business. I'm very wary about internet banking for instance. I don't quite trust that at the minute" (P013)*

Whilst these concerns impacted internet use for some, others used work-around strategies to confront these issues.

*"Talking about doing my banking online, I got a scam email and I thought this isn't right, so I printed it off and took it down to the bank, and because I had printed it off I was able to see things that you wouldn't see on the screen. They could see that it came from Russia" (P005)*

Even for the individuals in this study who used digital devices and social media, fear had an influence on their use of technology.

### *Culture and communication*

Perceptions and culture around communication impacted the way individuals used social media and their online connections. Individuals communicated online in different ways, with some using social media more actively than others. Participants also discussed their moral attitudes to online forms of communication, including fear of miscommunication, that would not necessarily occur 'offline'. It was evident that despite all participants involved in this study using social media in some way, the way in which they used it differed considerably.

Even those actively posting on social media were cautious of what they posted and preferred direct forms of online communication with family or friends for more 'private' matters.

> *"I will message people if it is a private message then I would just message someone, it doesn't go public" (P003)*

Despite keeping up to date with others' online profiles, many did not actively share their own information.

> *"I mean I know that there is this thing with Twitter that I am not involved in. I don't tend to post. I read posts from other people" (P006)*

Whereas some individuals actively used social media themselves, others used it as a way of keeping up with others. Participants' active or passive style of social media use was sometimes due to their attitudes to others' online communication via social media.

> *"People being very nasty. Sexist, racist, homophobic, you know, in the end I just cut… I came off that group. Even though I'm missing out on some bits and pieces, it just wasn't worth it" (P006)*

Some also worried about their own communication being misinterpreted, specifically when compared to being face-to-face.

> *"If they send me a text or I send them a text, it can be very abrupt and misinformed" (P008)*

Individuals' attitudes toward online communication, including communication from others and worrying about misinterpretation, influenced their own use of online communication tools.

### *Social capital*

Although definitions of social capital differ, one definition describes social capital as "*the features of social organisation such as networks, norms, and social trust that facilitate coordination and cooperation for mutual benefit*" (26).

Existing social networks supported individuals to become familiar with digital devices and social media. However, the influence of social capital did not end at this point, and it was also important for ongoing support and maintenance of digital device and social media use.

For many participants, their technology use was initiated by others. For some, they had not used digital devices before being introduced to them through family members, and occasionally friends, who bought the devices for them, or supported them to get started.

> *"Somebody bought me a [iPad] and then I felt obliged to use it. I don't think I would have bothered buying one for myself" (P002)*

> *"I have a grandson who has just recently moved to London who knows more or less… keeps me up to speed on things" (P009)*

Family members also introduced individuals to, or physically set up, social media platforms and text messaging applications. This was often for the purpose of connecting them to their family.

> *"My grandson put me onto Facebook because I've got one… I've got a grandson in Australia and I just wanted to [connect with him] and my granddaughter has put us on a little group with WhatsApp" (P013)*

One individual described how she felt pressured into using social media by her daughter, as it was the only way she could stay in communication with her whilst she was on holiday.

> *"I was very reluctant to go on Facebook initially and just for my children really especially my eldest daughter, it wasn't like a forced, you must get on Facebook, but it was… She was on holiday in New Zealand and she was posting photographs on Facebook. She said, if you want to see them you are going to have to go on Facebook […] I suppose it was a twisted arm to get me on Facebook […] I think they force you in a way, don't they, to get into modern technology" (P004)*

The importance of an individual's social network did not end at technology initiation. Participants often also relied on their social networks when learning something new, if they experienced technical issues. Individuals often asked family members for help when they were

not familiar with a digital device or social media platform, and they did not want to use it without their support.

> *"I can always pick up the phone and say, 'What's all this? How does this work?' I'm not afraid to ask the family, but I do tend to sort of ask them to show me how to do it rather than experiment" (P012)*

Some participants described accessing technical support from other sources, such as a high street shop, or using library services, when they had trouble with their digital devices.

> *"When we had the iPad bought for us, we went to Apple store down in [city] and they give you free tuition" (P004)*

> *"I'm a bit uncertain about some of the security stuff. I think I've got my settings set as they need to be for privacy and all that. I did go to a session in the library" (P016)*

Although not everyone relied on others and some were able to help others with their technical issues.

> "*I used to sit in the library and people used to come to me and… 'Help me. How do I do this and how do I do that?*'" (P011)

There was also concern when forecasting their own use of technology without continued support from family. This future loss of social capital was perceived as having an impact on future technology use, and therefore losing opportunities currently held.

> *"I don't know if I would be nervous in doing some things because I've never had to do it, I suppose […] I tend to leave it if somebody else will do it for me and I do find that is a handicap because if anything happens to [my husband] I don't know how… I would have to get the kids to do it" (P018)*

Existing social capital was of great importance for continued use of technology. Individuals often relied on members of their own family with more knowledge and experience of technology to support them from initial setup, as well as when learning something new, or when a technical issue needed dealing with.

### *Physical functioning*

One barrier to using digital devices was individuals' physical functioning, typically issues with their eyesight or persistent pain. This impacted the digital device they chose to use, and

individuals often chose larger devices, such as a tablet over a smartphone, due to the size of the screen.

> *"Then I'm having a problem with my eyes at the moment, I've got to have cataracts done so I find the tablet better to see as well" (P001)*

Persistent pain, particularly in the fingers and wrists, was also a problem and impacted the way in which individuals used technology.

> *"[The iPad] is bigger for my fingers" (P008)*

> *"Yes, you can see my hands there. Not good. I think I can get a bigger [smartphone] than this. But this was the one at the time. I can just about manage this. I mean my spelling is sometimes dreadful and I know that I have missed the keyboard, so I double check that all the time" (P018)*

This had some sway on the device purchased, the devices individuals could use, and how they used them. P018 specifically describes difficulties experienced when trying to communicate with others.

It is important to consider the interface of digital devices and social media as this can have implications for use.

## Phase two findings

Survey data facilitated analysis in three areas:

- Frequency of using digital devices, social media use, and visual communication tools
- Psychosocial predictors of digital device and social media use
- Ongoing technology support

### Frequency of using digital devices, social media, and visual communication tools

On average, participants in the NLNI group reported significantly higher use of digital devices (3.58 $\pm$ 0.64) than participants from the ELIB group (3.35 + 0.61; Table 4). Similarly, participants in the NLNI group reported significantly higher use of social media (3.57 $\pm$ 0.69) than participants in the ELIB group (3.40 + 0.73; Table 4).

**Table 4: Independent sample t-tests comparing frequency of digital device and social media use between NLNI and ELIB groups**

| | **Loneliness Isolation Binary** | **N** | **Mean** | **Std. Deviation** | **T** | **df** | **Sig. (2-tailed)** |
|---|---|---|---|---|---|---|---|
| Combined Digital device frequencies | NLNI | 205 | 3.58 | 0.64 | 3.75 | 408 | .000 |
| | ELIB | 205 | 3.35 | 0.61 | 3.75 | 406.9 | .000 |
| Combined social media frequencies | NLNI | 205 | 3.57 | 0.69 | 2.35 | 408 | .019 |
| | ELIB | 205 | 3.40 | 0.73 | 2.35 | 406.6 | .019 |

The use of visual communication tools was compared between the NLNI group and the ELIB groups (Table 5). The analysis revealed that a significantly higher proportion of participants from the NLNI group engaged with visual communication tools compared to those from the ELIB groups across all four factors: sending pictures [38.3% vs. 33.9%], receiving photos [47.3% vs. 41.7%], making video calls [23.4% vs. 18.3%], and receiving video calls [25.9% vs. 19.5%]. Across both groups, older adults mostly engaged in receiving pictures (89%) and the least in making video calls (41.7%).

**Table 5: Chi-square analysis comparing frequency of visual communication tools use between NLNI and ELIB groups**

| | NLNI | ELIB | Total | $\chi^2$ | p-value |
|---|---|---|---|---|---|
| **Send Pictures** | 157 (38.3%) | 139 (33.9%) | 296 (72.2%) | 3.94 | 0.05 |
| **Receive Pictures** | 194 (47.3%) | 171 (41.7%) | 365 (89%) | 13.21 | <0.05 |
| **Make Video Calls** | 96 (23.4%) | 75 (18.3%) | 171 (41.7%) | 4.24 | <0.05 |
| **Receive Video Calls** | 106 (25.9%) | 80 (19.5%) | 186 (45.4%) | 6.65 | <0.05 |

## Psychosocial Predictors of digital device and social media use

Multiple regression models were ran using the stepwise method to predict frequency of digital and social media use from barriers (negative attitudes) and facilitators (relationship maintenance, passing time, virtual community, entertainment, coolness, and companionship; Table 6). Age, gender, and education were controlled for. The analysis arrived at four models of factors predicting frequency of digital technology use and social media use for both participant groups (NLNI and ELIB).

**Table 6. Regression model showing predictors of digital device and social media use, in both NLNI and the ELIB groups.**

| Model | Variable | B | S.E. | β | *t* | p-value |
|---|---|---|---|---|---|---|
| | | | *NLNI Digital Device Use* | | | |
| **NLNI Digital Device Use** | (Constant) | 4.287 | .550 | | 7.800 | .000 |
| | Gender | -.076 | .085 | -.060 | -.900 | .369 |
| | Education | -.155 | .041 | -.252 | -3.790 | .000 |
| | Age categories | -.129 | .085 | -.101 | -1.514 | .132 |
| | Negative attitudes | -.159 | .047 | -.230 | -3.379 | .001 |
| | Anxious attitudes | .129 | .179 | .049 | .721 | .472 |
| | Passing time | .284 | 1.43 | .132 | 1.978 | .049 |
| | | | *NLNI Social Media Use* | | | |
| **NLNI Social Media Use** | (Constant) | 4.724 | .248 | | 19.010 | .000 |
| | Gender | -.013 | .082 | -.010 | -.163 | .870 |
| | Education | -.112 | .040 | -.168 | -2.791 | .006 |
| | Age categories | -.212 | .083 | -.154 | -2.565 | .011 |
| | Negative attitudes | -.225 | .041 | -.335 | -5.425 | .000 |
| | Entertainment | .407 | .114 | .226 | 3.572 | .000 |
| | Passing time | .383 | .148 | .166 | 2.594 | .010 |
| | | | *ELIB Digital Device Use* | | | |
| **ELIB Digital Device Use** | (Constant) | 3.685 | .463 | | 7.964 | .000 |
| | Gender | .057 | .083 | .048 | .685 | .494 |
| | Education | -.059 | .044 | -.095 | -1.362 | .175 |
| | Age categories | -.011 | .088 | -.009 | -.129 | .897 |
| | Negative attitudes | -.124 | .044 | -.199 | -2.801 | .006 |
| | Anxious attitudes | .046 | .149 | .022 | .310 | .757 |
| | | | *ELIB Social Media Use* | | | |
| **ELIB Social Media Use** | (Constant) | 3.486 | .304 | | 11.460 | .000 |
| | Gender | .198 | .096 | .139 | 2.067 | .040 |
| | Education | .034 | .050 | .046 | .678 | .499 |
| | Age categories | -.083 | .102 | -.054 | -.814 | .417 |
| | Negative attitudes | -.119 | .049 | -.165 | -2.403 | .017 |
| | Relationship Maintenance | .518 | .144 | .252 | 3.593 | .000 |

The model significantly predicted frequency of digital device use for NLNI participants ($R^2$ = 0.13). Negative attitudes to digital technologies was the only variable that added significantly to this prediction for NLNI participants' use of digital devices. In terms of NLNI use of social media, the model significantly predicted frequency of social media use ($R^2$ = 0.31). Negative

attitudes, passing time, and entertainment significantly contributed to this prediction for NLNI participants' use of social media.

For ELIB participants' use of digital devices, the model did not significantly predict frequency of digital device use ($R^2$ = .05). Negative attitudes towards digital technologies was the only variable that added significantly to this prediction of ELIB participants' use of digital devices. For ELIB participants' use of Social Media, the model significantly predicted frequency of social media use for the ELIB group, ($R^2$ = .13). Negative attitudes to digital technology use and relationship maintenance added significantly to this prediction of ELIB participants' use of social media.

## Ongoing technology Support

Survey respondents also identified where they seek support when facing difficulties with a digital device (Table 7).

**Table 7: Descriptive statistics of support seeking when faced with difficulties using a digital device**

| | NLNI | ELIB | Total |
|---|---|---|---|
| **Ask a family member** | 131 (55.7%) | 104 (44.3%) | 235 (100%) |
| **Ask a friend** | 44 (55%) | 36 (45%) | 80 (100%) |
| **Visit a community centre or technology shop** | 35 (58.3%) | 25 (41.7%) | 60 (100%) |
| **Research online** | 128 (49%) | 133 (51%) | 261 (100%) |
| **Do not know** | 4 (80%) | 1 (20%) | 5 (100%) |

Findings revealed that participants across the NLNI and ELIB groups mostly preferred to research solutions themselves on the Internet (NLNI: 49%, ELIB: 51%) but this was closely followed by asking a family member (NLNI: 55.7%, ELIB: 44.3%).

## Discussion

### Technology for social connection

Remaining in contact with family and friends is often perceived as being one of the most important aspects of being online (1, 2) and individuals described the advantages of using digital devices and social media as a method of social connection, especially in maintaining meaningful online relationships with people they already knew. In this study, social technology (27), including social media sites had various benefits such as the ability to connect with others living geographically dispersed, as well as an increased frequency of communication. Individuals specifically stated they would feel "cut off" without the use of technology as a source of communication. The imperative role of the family in internet and social media use has been explored elsewhere and social media sites can provide a clear point of contact with family and friends with whom they wanted to maintain a strong relationship (7). In this respect, it is evident that, for most, social technology was used primarily as a tool to enhance existing connections, rather than as a way of escaping the social world and withdrawing (27-29). Ultimately, this has the potential to increase satisfaction with social networks and reduce loneliness. Only one participant experienced displacement of offline relationships with online ones, although others acknowledged that this withdrawal from offline activities and social relationships would not be difficult.

Interestingly, Phase two of this study found that levels of perceived loneliness and/or social isolation impacted the frequency of digital device and social media use, as well as the way in which they used digital devices and social media. Levels of perceived loneliness and/or social isolation are also predictors of using technology in different ways – individuals who do not perceive themselves to be lonely or isolated report using technology for reasons such as entertainment and passing time, whereas those who are lonely, social isolated, or both, report using technology for reasons such as relationship maintenance. There is a clear difference in motivations for technology use between these groups. These findings further highlight the complexity of the relationship between loneliness and technology use, as discussed in the review by Nowland, Necka (27).

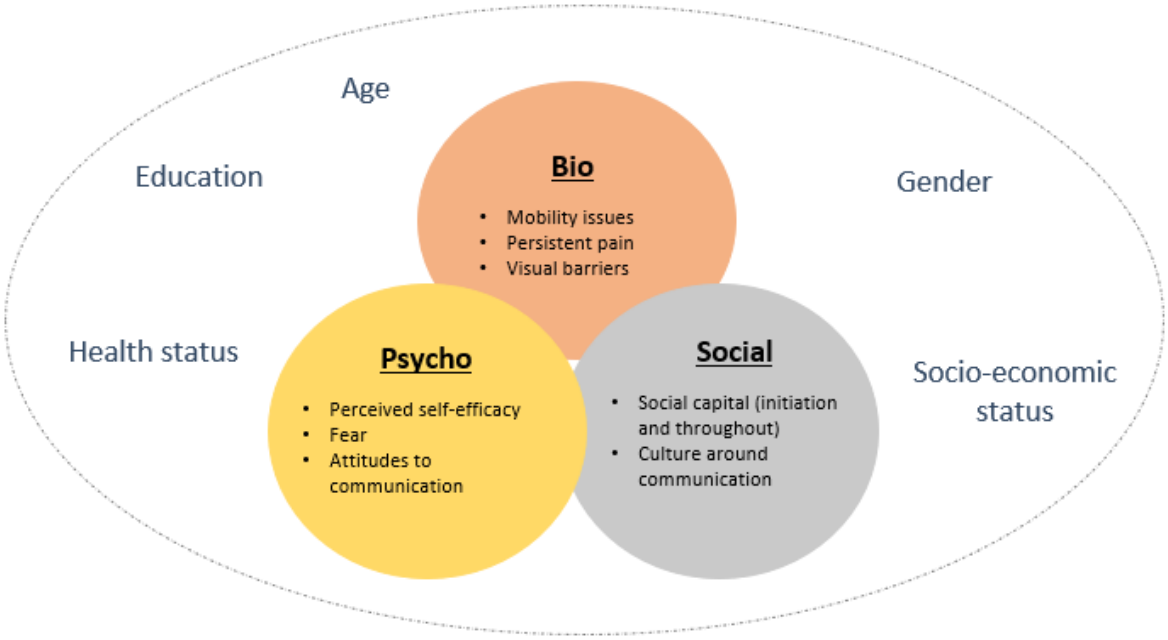
Online visual communication was considered as being a vital aspect of using technology for social connection as this was most reminiscent of face-to-face communication. Phase two findings also revealed non-lonely or isolated older adults were significantly more likely to engage with visual communication tools compared to those who perceived themselves as being lonely, social isolated, or both, including, sending photographs, receiving photographs, making video calls, and receiving video calls. Previous evidence also suggests the importance of online telecommunication applications, such as Facetime or Skype (2), and photo sharing as a preferred option for older adults than text messaging (2, 30) as it can provide a

background for conversations with relatives living geographically dispersed (31-33). The use of technology, specifically online visual communication tools, for social connection was valuable as an alternative method of social connection, and whilst they still preferred face-to-face communication, technology allowed them to connect with friends and family when this was not possible.

### Biopsychosocial facilitators and barriers for Gerontechnological social connection

The complexity of digital exclusion was emphasised in this study in that even those older adults who regularly used digital devices, social media, and visual communication tools experienced barriers which negatively influenced their use. Specifically, this study reported a number of biopsychosocial barriers which impacted technology use for social connection (Figure 2).

**Figure 2: Model of biopsychosocial facilitators and barriers for Gerontechnological Social Connection and wider factors impacting digital exclusion**




The model above shows wider factors influencing digital exclusion, as well as the specific biopsychosocial factors influencing use of digital devices and social media specifically for the use of social connection.

*Physical functioning (Biological / physical)*

Physical barriers of technology use were experienced, such as text or buttons being too small. Previous research has shown that physical factors such as dexterity or problems with vision can impact usage, especially when using smaller tablets or mobile phones (34, 35). Research has also found significantly lower rates of computer and internet usage among older adults with disabilities (36, 37).

*Self-efficacy (Psychological)*

Self-efficacy is the most influential factor impacting online activity (2, 38-40). In this study, higher levels of self-efficacy were often related to early adoption. Perceived low confidence or feeling like a 'novice' created a barrier to technology use. However, individuals perceived their own age as a factor in determining lower self-efficacy and their lack of familiarity with technology, considering others of a similar age or older as having less understanding or less experience of using computers, mobile technology, the internet, social media, and applications (apps).

*Fear (Psychological)*

Older adults can generally perceive the internet as a risky place and this can impact upon technology usage (2). Fear of breaking technology acted as another barrier of use, seconded by fear of privacy and security issues. The findings from this study support existing research which stresses that older adults are more vulnerable to misinformation.

*Culture and communication (Social)*

Social norms differ online, and users frequently exhibit different and sometimes unpleasant behaviours (5), and therefore internet culture, specifically the culture of social media, can be off-putting. Findings from this study showed that cultural differences around communication impacted the way older adults used social media and their online connections. While some participants were more active users of social media, others were more passive. Some worried about how they would come across using social media or did not like the way others communicated via social media.

*Lack of social capital (social)*

Finally, an individual's social network was highly influential in the initiation of technology use and was important for ongoing support and maintenance of using digital devices and social media. The existence of social capital perpetuated digital inclusion and supports evidence which highlights the importance of social ties for older adults (41, 42). Those that have existing social support were more likely to be using technology due to supported initiation, and supported maintenance or troubleshooting (2, 15, 43).

## COVID-19

Whilst this study was carried out before the onset of COVID-19, the findings from this study are relevant to the pandemic. The impact that COVID-19 has had on loneliness and social isolation has been unprecedented. With so many people being unable to communicate with others in person, technology use, especially visual communication tools, has allowed individuals to maintain connected with others outside of their home. However, as highlighted in this study, not everyone has access to these tools due to access, limited skills, and the biopsychosocial barriers related to Gerontechnological Social Connection presented in this study. The reliance on technology during the COVID-19 pandemic has brought the digital divide to the fore, further perpetuating the divide between those able to access and use online support tools and those excluded from this support. It is essential to address the biopsychosocial barriers for Gerontechnological Social Connection to reduce this digital divide and increase inclusivity of using technology for social connection.

## Strengths and limitations

This study has both strengths and limitations. One strength of this study is the sequential mixed methods design, as this design allowed the survey to be developed using both validated scales and bespoke questions based on the findings from Phase one. Another strength of this study was the wide geographical reach across the UK, meaning that we were able to draw upon experiences from a number of geographical regions and therefore the findings are of national significance. A final strength is that rather than referring to 'technology' the findings are broken down into digital devices, social media, and visual communication tools. Evidence often describes technology in a generalist way, referring solely to 'technology' which makes it difficult to identify and understand use. This becomes of real consequence when the research involves older adults and those who are less familiar with the terminology. It was therefore important that the survey was designed to explicitly take into account both digital devices,

social media and visual communication and to move away from the generalist approach of previous studies.

This study is limited in that the absence of data from ethic diverse groups across both phases. Furthermore, participants who are 'digitally excluded', and therefore have a limited online presence were not included in this study. Another limitation to this study is the lack of outcomes on positive attitudes toward digital device use, social media use, or use of visual communication tools. The tool used only identified 'technology' generally, and therefore this measure is not reported in the current paper. Finally, another limitation to this study is that due to the cross-sectional nature of the self-reported data it is not possible to conclude on the directionality of the findings, i.e. whether loneliness or social isolation have an impact on technology use or if technology use has an impact on loneliness or social isolation.

### Recommendations for practice

1. This study showed that individuals experiencing loneliness or social isolation use technology for social connection significantly less than those not experiencing loneliness or isolation. A preventative approach should be taken in supporting lonely or isolated individuals with opportunities to engage with technology for social connection.
2. Negative attitudes adversely affected use of digital devices and social media, independent of loneliness or social isolation, therefore, interventions should aim to target negative attitudes around using social technologies for all individuals.
3. This study showed that digital exclusion can also be experienced by regular technology users, and it is therefore recommended that the definition of digital exclusion is broadened and includes wider biopsychosocial factors. It is imperative that regular technology users are not overlooked when new technologies and services are being developed, or digital connection is being promoted. This will help to maximise the regular use, minimise the potential of disengaging, and promote the use of technology for social connection.

### Recommendations for future research

As described above, there were some limitations to this study's sample. Therefore, it is recommended that future research should take a purposive sampling approach and paper-based surveys to address this limitation. This would serve to understand further facilitators and barriers individuals face when it comes to accessing and using technology, in addition to collecting data on loneliness and social isolation.

It is important to examine the development of innovative solutions which consider these potential facilitators and barriers of use. Particularly through inclusive and participatory design.

## Conclusions

Access and use of digital devices and social media were valued as tools for social connection. However, online communication was perceived as being supplementary, the best available alternative, but was not a replacement for face-to-face communication. In terms of social connection, this also identified a relationship between loneliness, social isolation, and older adults' use of technology use. Older technology users who were neither lonely nor isolated used technology to connect with others significantly more often than those who experienced loneliness, isolation, or both.

Despite being regular technology users, individuals still experienced biopsychosocial barriers, including physical functioning, self-efficacy, fear, attitudes toward communication, culture of communication, and social capital, when using technology for social connection. These biopsychosocial barriers of Gerontechnological use can significantly heightening inequalities for individuals in many ways, even those with access to this technology. Negative attitudes were the only psychosocial factor that significantly predicted both digital device use and social media use across the groups.

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## Appendix A: Interview schedule

General introductions and to introduce the purpose of the interview.

1. Please tell me if/how you use technology to communicate with others.
   Do you use social media? (e.g. Facebook/twitter)
   Do you use communication tools such as Skype/FaceTime?
   Do you use anything else?
   (Discuss the mode, frequency, who they contact, reasons for doing so).

2. Please tell me about other ways (if any) that you connect with others.
   Do you attend social groups for example?
   Meet people face-to-face or over the telephone?

3. Please tell me about your knowledge of/ use of technology generally.

4. Who instigated your use of technology as a form of communication?
   Did you try it yourself, did your family/friends suggest this, or something else?

5. How long have you been using technology to communicate with others?

6. How do you feel about using technology to communicate with others?
   Are there any facilitators or barriers to its use?
   Is it easy/difficult?
   Is this the same, better or worse than meeting someone face-to-face?

7. Has the use of technology changed the way in which you communicate with others?
   If so, how?

8. Do you have any further questions?

Give thanks for their participation and provide further information if appropriate.

## Appendix B: Phase 2 survey

**Understanding the experiences of older adults using social technology to stay connected: A facilitator or creator of new vulnerabilities?**

You have been invited to be part of a study exploring experiences of using social technology to stay connected to others. Before deciding if you would like to be involved in this project it is important that you understand why it is taking place and what it would mean for you.

Please take the time to read this information.

Please click on the study information link below to download a detailed information sheet.

If you have any questions you are encouraged to speak to a member of the research team (contact details within this document).

**Participant Consent**

I have read and understand the attached Information Sheet and I understand I have the opportunity to ask the research team any questions.

I understand that I do not have to take part. If I do take part I may withdraw at any time, without giving reason.

I understand that any information provided will be strictly confidential and that no names/identifying information will be used.

I understand that the information I have given in this study may be used in the future as part of further work on this subject.

I agree to take part in this study.

- ○ I agree
- ○ I do not agree

**Demographic Questions**

My gender is:

- ○ Male
- ○ Female
- ○ Other
- ○ Prefer not to say

What is your age?

My marital status is:

- ○ Single
- ○ Married, Civil Partnership or Cohabiting
- ○ Separated or divorced
- ○ Bereaved
- ○ Other

My education level is:

- ○ Degree or above
- ○ Below degree level
- ○ Other
- ○ No formal qualifications

Where do you live?

- ○ Northern England (North West, North East, Yorkshire & the Humber)
- ○ Mid England (West Midlands, East - Midlands & East of England)
- ○ Southern England (South West & South East)
- ○ Greater London
- ○ Scotland
- ○ Wales & Northern Ireland

**Frequency of Technology Use**

1. How frequently do you use the following **digital devices** to communicate with other people?

| | Not sure what it is (1) | Never (2) | Monthly (3) | Weekly (4) | Daily (5) | More than once a day (6) |
|---|---|---|---|---|---|---|
| Desktop computer | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Laptop | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Mobile phone | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| iPad or tablet | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Alexa | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Google Home | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

2. How frequently do you use the following **social media platforms** to communicate with other people?

| | Not sure what it is (1) | Never (2) | Monthly (3) | Weekly (4) | Daily (5) | More than once a day (6) |
|---|---|---|---|---|---|---|
| Email | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Facebook | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Facebook messenger | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Video calling (e.g. FaceTime or Skype) | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Twitter | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| WhatsApp | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Instagram | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

**Technology Initiation**

3. Who introduced you to using **digital devices** as a means of communication?

| | Yourself (1) | Suggestion from family members (2) | Suggestion from friends (3) | Not applicable (4) |
|---|---|---|---|---|
| Desktop computer | ○ | ○ | ○ | ○ |
| Laptop | ○ | ○ | ○ | ○ |
| Mobile phone | ○ | ○ | ○ | ○ |
| iPad or tablet | ○ | ○ | ○ | ○ |
| Alexa | ○ | ○ | ○ | ○ |
| Google home | ○ | ○ | ○ | ○ |

4. Who introduced you to using **social media platforms** as a means of communication?

| | Yourself (1) | Suggestion from family members (2) | Suggestion from friends (3) | Not applicable (4) |
|---|---|---|---|---|
| Email | ○ | ○ | ○ | ○ |
| Facebook | ○ | ○ | ○ | ○ |
| Facebook messenger | ○ | ○ | ○ | ○ |
| Video calling (e.g. FaceTime or Skype) | ○ | ○ | ○ | ○ |
| Twitter | ○ | ○ | ○ | ○ |
| WhatsApp | ○ | ○ | ○ | ○ |
| Instagram | ○ | ○ | ○ | ○ |

5. Have you used / do you use computers in your working life?

○ Yes

○ No

**Seeking technological support**

6. If you **have a problem** with your digital device(s), what would you do? Please tick all that apply.

- ☐ Ask a family member
- ☐ Ask a friend
- ☐ Visit a community centre or technology shop
- ☐ Research the answers on the internet
- ☐ I would not know what to do

7. In general, I **could complete** any desired task using any computer/Internet application **if**...

| | Not at all confident 0 1 2 3 4 5 6 7 8 9 10 Totally confident |
|---|---|
| There was no one around to tell me what to do as I go |  |
| I had never used a technology like it before |  |
| I had only the manuals for reference |  |
| I had seen someone else using it before trying it myself |  |
| I could call someone for help if I got stuck |  |
| Someone else had helped me get started |  |
| I had a lot of time to complete the task for which the technology was provided |  |
| I had just the built-in help facility for assistance |  |
| Someone showed me how to do it first |  |
| I had used similar technologies before this one to do the same task |  |

**Reasons for Use**

8. Who do you connect with using social technology?

- ☐ Family
- ☐ Friends
- ☐ Existing social networks

9. The following series of questions **refer to your reasons for using social media platforms** (e.g. Facebook, Twitter, Skype etc). **Please tick all that apply.**

I use social media for the following reasons...

- ☐ To send a message to a friend
- ☐ To post a message on my friend's wall
- ☐ To communicate with my friends
- ☐ To stay in touch with friends
- ☐ Get in touch with people I know
- ☐ Get through to someone who is hard to reach
- ☐ To pass time when bored
- ☐ It is one of the routine things I do when online
- ☐ To occupy my time
- ☐ Develop a romantic relationship
- ☐ Find more interesting people than in real life
- ☐ Find companionship
- ☐ Meet new friends
- ☐ To see other people's pictures
- ☐ To read other people's profiles
- ☐ To enjoy it
- ☐ It makes me cool among my peers
- ☐ Have fun
- ☐ It is cool
- ☐ To feel less lonely
- ☐ No one to talk or be with
- ☐ So I won't be alone

**Visual Communications**

10. Do you **send** photographs to family and/or friends using your digital devices (e.g. laptop, mobile phone, iPad)?

- ○ Yes
- ○ No

11. Do you **receive** photographs to family and/or friends using your digital devices (e.g. laptop, mobile phone, iPad)?

- ○ Yes
- ○ No

12. How does communicating by sharing photographs using digital devices and social media **compare with** meeting someone face to face?

- ○ It feels the same
- ○ It is better
- ○ It is worse

13. Do you **make** video calls (e.g. FaceTime, Skype) to family and/or friends?

- ○ Yes
- ○ No

14. Do you **receive** video calls (e.g. FaceTime, Skype) from family and/or friends?

- ○ Yes
- ○ No

15. How does communicating by video calls **compare with** meeting someone face to face?

- ○ It feels the same
- ○ It is better
- ○ It is worse

16. How does communicating by video calls **compare with** using the telephone

- ○ It feels the same
- ○ It is better
- ○ It is worse

17. Other than communicating face to face, **the next best digital option** to communicate with family and/or friends is...

- ○ Telephone
- ○ Video calling (e.g. FaceTime or Skype)

- ○ Email
- ○ Text message
- ○ WhatsApp
- ○ Facebook
- ○ Facebook Messenger
- ○ Instagram
- ○ Twitter
- ○ None

**Feelings about Technology**

18. Please provide your opinion on the following statements which refer to digital devices (e.g. computer, laptop, mobile phone, iPad etc).

| | Strongly disagree (1) | Disagree (2) | Neutral (3) | Agree (4) | Strongly agree (5) |
|---|---|---|---|---|---|
| I feel anxious whenever I am using digital devices | ○ | ○ | ○ | ○ | ○ |
| I wish that I could be as calm as others appear to be when they are using digital devices | ○ | ○ | ○ | ○ | ○ |
| I am confident in my ability to use digital devices | ○ | ○ | ○ | ○ | ○ |
| I feel tense whenever working on a digital device | ○ | ○ | ○ | ○ | ○ |

19. Please provide your opinion on the following statements which refer to digital devices (e.g. computer, laptop, mobile phone, iPad etc).

| | Strongly disagree (1) | Disagree (2) | Neutral (3) | Agree (4) | Strongly agree (5) |
|---|---|---|---|---|---|
| I worry about making mistakes on digital devices | ○ | ○ | ○ | ○ | ○ |
| I try to avoid using digital devices whenever possible | ○ | ○ | ○ | ○ | ○ |
| I experience anxiety whenever I sit in front of a computer or other digital device | ○ | ○ | ○ | ○ | ○ |
| I enjoy working with digital devices | ○ | ○ | ○ | ○ | ○ |

20. Please provide your opinion on the following statements which refer to digital devices (e.g. computer, laptop, mobile phone, iPad etc).

| | Strongly disagree (1) | Disagree (2) | Neutral (3) | Agree (4) | Strongly agree (5) |
|---|---|---|---|---|---|
| I would like to continue working with digital devices in the future | ○ | ○ | ○ | ○ | ○ |
| I feel relaxed when I am working on a digital device | ○ | ○ | ○ | ○ | ○ |
| I wish that digital devices were not as important as they are | ○ | ○ | ○ | ○ | ○ |
| I am frightened by digital devices | ○ | ○ | ○ | ○ | ○ |

21. Please provide your opinion on the following statements which refer to digital devices (e.g. computer, laptop, mobile phone, iPad etc).

| | Strongly disagree (1) | Disagree (2) | Neutral (3) | Agree (4) | Strongly agree (5) |
|---|---|---|---|---|---|
| I feel content when I am working on a digital device | ○ | ○ | ○ | ○ | ○ |
| I feel overwhelmed whenever I am working on a digital device | ○ | ○ | ○ | ○ | ○ |
| I feel comfortable with digital device | ○ | ○ | ○ | ○ | ○ |
| I feel at ease with digital devices | ○ | ○ | ○ | ○ | ○ |

**Feelings about Technology**

22. Please provide your opinion on the following statements which refer to social media use (e.g. Facebook, Twitter, WhatsApp etc)

| | Strongly disagree (1) | Disagree (2) | Neutral (3) | Agree (4) | Strongly agree (5) |
|---|---|---|---|---|---|
| I feel anxious whenever I am using social media platforms | ○ | ○ | ○ | ○ | ○ |
| I wish that I could be as calm as others appear to be when they are using social media platform | ○ | ○ | ○ | ○ | ○ |
| I am confident in my ability to use social media platforms | ○ | ○ | ○ | ○ | ○ |
| I feel tense whenever working on a social media platform | ○ | ○ | ○ | ○ | ○ |

23. Please provide your opinion on the following statements which refer to social media use (e.g. Facebook, Twitter, WhatsApp etc)

| | Strongly disagree (1) | Disagree (2) | Neutral (3) | Agree (4) | Strongly agree (5) |
|---|---|---|---|---|---|
| I worry about making mistakes on social media | ○ | ○ | ○ | ○ | ○ |
| I try to avoid using social media whenever possible | ○ | ○ | ○ | ○ | ○ |
| I experience anxiety whenever I sit in front of a computer or other digital device to use social media | ○ | ○ | ○ | ○ | ○ |
| I enjoy working with social media platforms | ○ | ○ | ○ | ○ | ○ |

24. Please provide your opinion on the following statements which refer to social media use (e.g. Facebook, Twitter, WhatsApp etc)

| | Strongly disagree (1) | Disagree (2) | Neutral (3) | Agree (4) | Strongly agree (5) |
|---|---|---|---|---|---|
| I would like to continue working with social media platforms in the future | ○ | ○ | ○ | ○ | ○ |
| I feel relaxed when I am working with social media | ○ | ○ | ○ | ○ | ○ |
| I wish that social media platforms were not as important as they are | ○ | ○ | ○ | ○ | ○ |
| I am frightened by social media | ○ | ○ | ○ | ○ | ○ |

25. Please provide your opinion on the following statements which refer to social media use (e.g. Facebook, Twitter, WhatsApp etc).

| | Strongly disagree (1) | Disagree (2) | Neutral (3) | Agree (4) | Strongly agree (5) |
|---|---|---|---|---|---|
| I feel content when I am using social media platforms | ○ | ○ | ○ | ○ | ○ |
| I feel overwhelmed whenever I am using social media platforms | ○ | ○ | ○ | ○ | ○ |
| I feel comfortable with social media | ○ | ○ | ○ | ○ | ○ |
| I feel at ease with social media | ○ | ○ | ○ | ○ | ○ |

**Attitudes towards Technology**

26. Please consider the below statements...

| | Strongly disagree (1) | Disagree (2) | Neither agree nor disagree (3) | Agree (4) | Strongly agree (5) |
|---|---|---|---|---|---|
| I feel it is important to be able to find any information whenever I want online | ○ | ○ | ○ | ○ | ○ |
| I feel it is important to be able to access the Internet any time I want | ○ | ○ | ○ | ○ | ○ |
| I think it is important to keep up with the latest trends in technology | ○ | ○ | ○ | ○ | ○ |

27. Please consider the below statements...

| | Strongly disagree (1) | Disagree (2) | Neither agree nor disagree (3) | Agree (4) | Strongly agree (5) |
|---|---|---|---|---|---|
| I get anxious when I don't have my mobile phone | ○ | ○ | ○ | ○ | ○ |
| I get anxious when I don't have the Internet available to me | ○ | ○ | ○ | ○ | ○ |
| I am dependent on my technology | ○ | ○ | ○ | ○ | ○ |

28. Please consider the below statements...

| | Strongly disagree (1) | Disagree (2) | Neither agree nor disagree (3) | Agree (4) | Strongly agree (5) |
|---|---|---|---|---|---|
| Technology will provide solutions to many of our problems | ○ | ○ | ○ | ○ | ○ |
| With technology anything is possible | ○ | ○ | ○ | ○ | ○ |
| I feel that I get more accomplished because of technology | ○ | ○ | ○ | ○ | ○ |

29. Please consider the below statements...

| | Strongly disagree (1) | Disagree (2) | Neither agree nor disagree (3) | Agree (4) | Strongly agree (5) |
|---|---|---|---|---|---|
| Digital devices make people waste too much time | ○ | ○ | ○ | ○ | ○ |
| Digital devices make life more complicated | ○ | ○ | ○ | ○ | ○ |
| Digital devices make people more isolated | ○ | ○ | ○ | ○ | ○ |

30. Please consider the below statements...

| | Strongly disagree (1) | Disagree (2) | Neither agree nor disagree (3) | Agree (4) | Strongly agree (5) |
|---|---|---|---|---|---|
| Social media makes people waste too much time | ○ | ○ | ○ | ○ | ○ |
| Social media makes life more complicated | ○ | ○ | ○ | ○ | ○ |
| Social media makes people more isolated | ○ | ○ | ○ | ○ | ○ |

**Technology & Privacy**

31. Please consider the below statements...

| | Strongly disagree (1) | Disagree (2) | Neither agree nor disagree (3) | Agree (4) | Strongly agree (5) |
|---|---|---|---|---|---|
| When I share the details of my personal life with somebody, I often worry that he/she will tell those details to other people | ○ | ○ | ○ | ○ | ○ |
| I am concerned that people around me know too much about me | ○ | ○ | ○ | ○ | ○ |
| I am concerned with the consequences of sharing identity information | ○ | ○ | ○ | ○ | ○ |
| I worry about sharing information with more people than I intend to | ○ | ○ | ○ | ○ | ○ |

**Loneliness**

As part of our study investigating the experiences of older adults to stay connected, we are also

interested in finding out whether there are any perceived changes in loneliness and isolation. The following section of this survey therefore asks questions surrounding loneliness and social isolation.

32. When answering the following questions, it is best to think of your life as it generally is now.

| | Yes (1) | More or less (2) | No (3) |
|---|---|---|---|
| I experience a general sense of emptiness | ○ | ○ | ○ |
| I miss having people around me | ○ | ○ | ○ |
| I often feel rejected | ○ | ○ | ○ |
| There are plenty of people I can rely on when I have problems | ○ | ○ | ○ |
| There are many people I can trust completely | ○ | ○ | ○ |
| There are enough people I feel close to | ○ | ○ | ○ |

**Social Networks**

33. Consider the people to whom you are related by birth, marriage, adoption etc...

| | None (1) | One (2) | Two (3) | Three or Four (4) | Five to Eight (5) | Nine or more (6) |
|---|---|---|---|---|---|---|
| How many relatives do you see or hear from at least once a month? | ○ | ○ | ○ | ○ | ○ | ○ |
| How many of these do you communicate with using technology? | ○ | ○ | ○ | ○ | ○ | ○ |
| How many relatives do you feel at ease with that you can talk about private matters? | ○ | ○ | ○ | ○ | ○ | ○ |
| How many relatives do you feel close to such that you could call on them for help? | ○ | ○ | ○ | ○ | ○ | ○ |

34. Considering all of your friends, including those who live in your neighbourhood...

| | None (1) | One (2) | Two (3) | Three or Four (4) | Five to Eight (5) | Nine or more (6) |
|---|---|---|---|---|---|---|
| How many of your friends do you see or hear from at least once a month? | ○ | ○ | ○ | ○ | ○ | ○ |
| How many of these do you communicate with using technology? | ○ | ○ | ○ | ○ | ○ | ○ |
| How many friends do you feel at ease with that you can talk about private matters? | ○ | ○ | ○ | ○ | ○ | ○ |
| How many friends do you feel close to such that you could call on them for help? | ○ | ○ | ○ | ○ | ○ | ○ |

35. Considering those who you see regularly but are not close friends with...

| | None (1) | One (2) | Two (3) | Three or Four (4) | Five to Eight (5) | Nine or more (6) |
|---|---|---|---|---|---|---|
| How many of your casual acquaintances do you see or hear from at least once a month? | ○ | ○ | ○ | ○ | ○ | ○ |
| How many of these do you communicate with using technology? | ○ | ○ | ○ | ○ | ○ | ○ |
| How many casual acquaintances do you feel at ease with that you can talk about private matters? | ○ | ○ | ○ | ○ | ○ | ○ |
| How many casual acquaintances do you feel close to such that you could call on them for help? | ○ | ○ | ○ | ○ | ○ | ○ |

Thank you for taking part in our survey. Please take a moment to read our Debrief sheet which is available to download using the link below. If you have any questions, a reminder of relevant contact details for the research team is shown below:

Dr Gemma Wilson Gemma.wilson@northumbria.ac.uk 0191 215 6054.

If you would like independent information about this project, please contact: Dr Peter McMeekin Peter.mcmeekin@northumbria.ac.uk 0191 215 6368.